

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
13 January 2005 (13.01.2005)

PCT

(10) International Publication Number  
**WO 2005/003845 A3**

(51) International Patent Classification<sup>7</sup>: H03F 7/00

**H01S 3/10,**

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number:  
**PCT/US2003/041710**

(22) International Filing Date:  
31 December 2003 (31.12.2003)

(25) Filing Language: English

(84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(30) Priority Data:  
60/444,544 3 February 2003 (03.02.2003) US

## Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(71) Applicant (*for all designated States except US*): BAE SYSTEMS INFORMATION AND ELECTRONIC SYSTEMS INTEGRATION INC. [US/US]; 65 Spit Brook Road, NHQ01-719, Nashua, NH 03061 (US).

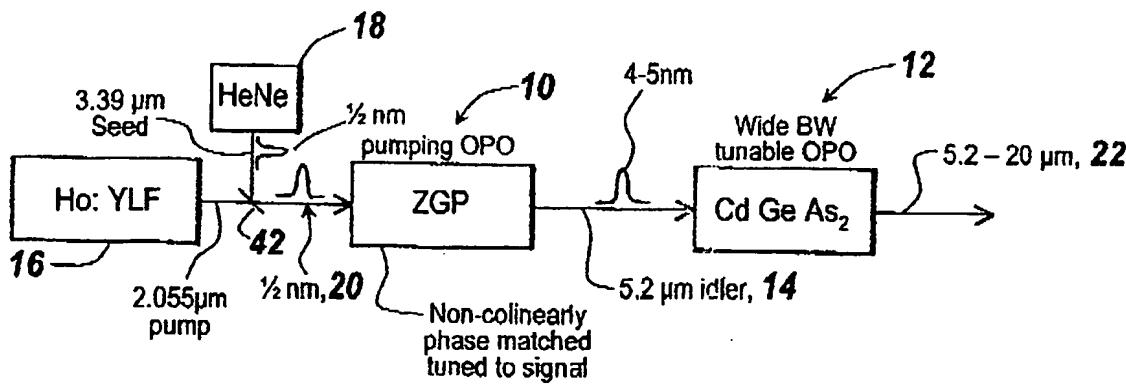
(72) Inventor; and  
(75) Inventor/Applicant (*for US only*): SETZLER, Scott, D. [US/US]; 32 Forest Street, Manchester, NH 03102 (US).

(88) Date of publication of the international search report:  
16 June 2005

(74) Agent: LONG, Daniel, J.; BAE Systems Information and Electronic Systems Integration Inc., 65 Spit Brook Road, NHQ01-719, Nashua, NH 03061 (US).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: METHOD AND APPARATUS FOR GENERATING MID AND LONG IR WAVELENGTH RADIATION



(57) Abstract: A narrow line width optical parametric oscillator (OPO) (10) is used a pump for a tunable optical parametric oscillator to enable it to produce a mid and long wavelength IR output over a wide 5-20 micron bandwidth. The pumping OPO (10) is then set up to be non-collinearly phase matched. To enable the pumping OPO (10) to exhibit the narrow line width, it is seeded with a narrow line width seeding source. The result is output energy having an extremely narrow 4 nanometer line width. The narrowness of the pumping OPO (10) output is derived first by using non-collinear phase matching in the pumping OPO (10) and secondly by using seeding in the pumping of the pumping OPO (10).

WO 2005/003845 A3